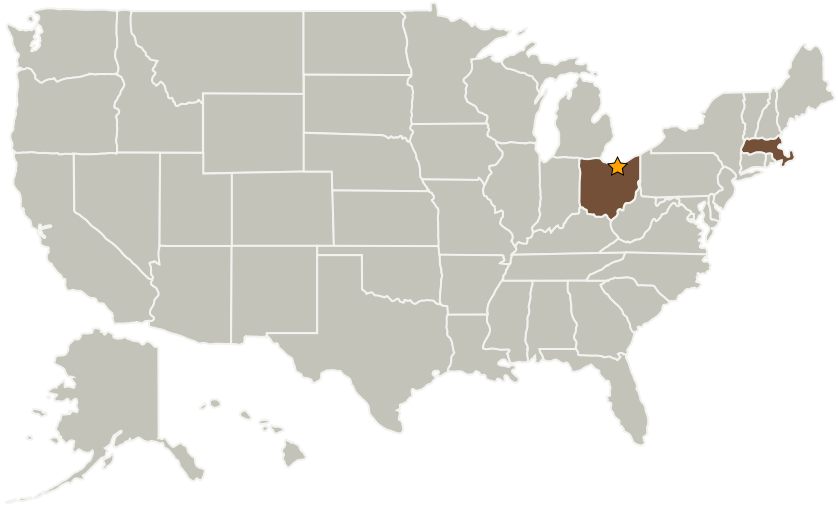
Inorganic Polymer Nanocomposite Cathode for Long Cycle Life Lithium - Sulfur Batteries, Phase I

Completed Technology Project (2008 - 2008)

Project Introduction

Physical Sciences Inc. (PSI) proposes to develop a hybrid composite structure of molybdenum disulfide (MoS2) with a class of polysulfide for lithium-sulfur rechargeable batteries on a Phase I program. This cathode provides safety, improved cycle-life, and high capacity at a competitive cost. Crystalline MoS2 is low cost and has a theoretical capacity of 335 mAh/g but it has a low conductivity. The nanocomposite design provides a synergistic improvement in conductivity and electrochemical cycling as a result of the layered MoS2 structure, provided by the intercalation of polysulfide. In the Phase I program, PSI will demonstrate a technology readiness level of 3 with a cathode energy density of greater than 350 mAh/g (800 Wh/kg) using 2 mAh cells. These performance goals will result in an overall battery energy density of 350 Wh/kg. In the Phase II program, PSI will increase cell size to 250 mAh and optimize cell design to further improve cycle life.

Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
★Glenn Research Center(GRC)	Lead Organization	NASA Center	Cleveland, Ohio
Physical Sciences, Inc.	Supporting Organization	Industry	Andover, Massachusetts

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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Glenn Research Center (GRC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Primary U.S. Work Locations	
Massachusetts	Ohio

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Aron Newman

Technology Areas

Primary:

- TX03 Aerospace Power and Energy Storage
  - TX03.2 Energy Storage
    - TX03.2.1 Electrochemical: Batteries